

REMARKS/ARGUMENTS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 1-19 are pending in the application.

In the Office Action Figures 5A-C, 8A-D, 9A-E and 10A-D of the drawings were again objected to. In response to the objection asserting that Figures 5A-C, 8A-D, 9A-E and 10A-D are "unintelligible, it is noted that the response filed on October 27, 2005, included black and white photographs as new Figures 5A-C, 8A-D, 9A-E and 10A-D. If the present objection is being made as to these newly submitted black and white photographs as the new Figures 5A-C, 8A-D, 9A-E and 10A-D, an explanation as to what, specifically, is being objected to as being unintelligible in these black and white photographs is respectfully requested. In this regard and as noted in the response filed October 27, 2005, it is respectfully submitted that photographs are the only practical medium to intelligibly show features of the present invention, including the microfacets.

Accordingly, it is respectfully requested that this objection to new Figures 5A-C, 8A-D, 9A-E and 10A-D of the drawings be either more precisely explained if maintained or that it be withdrawn.

With respect to the objection raised as to FIG. 9D not showing colors of microfacets, the above-noted last response amended the previous statement in the specification so that it no longer states that the colors of the microfacets are shown in Figure 9D. Therefore, the objection raised as to FIG. 9D not showing colors of microfacets is not based on any statement presently made by the specification.

Accordingly, it is respectfully requested that this objection to FIG. 9D of the drawings be withdrawn.

The rejections presented in the outstanding Office Action included a rejection of Claims 1, 2, 5, 8, 9, 12, 14, 15 and 18 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,573,912 to Suzuki et al. (Suzuki) in view of U.S. Patent No. 5,936,626 to Beasley. Claims 13 and 19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Suzuki in view of Beasley, and further in view of the publication to Neugebauer. Claims 3, 10 and 16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Suzuki in view of Beasley, and further in view of U.S. Patent No. 6,313,841 to Ogata et al. Claims 4, 6, 7, 11 and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Suzuki in view of Beasley, and further in view of U.S. Patent No. 6,118,452 to Gannett. It is requested that the rejections of the claims be withdrawn, and that the claims be allowed, for the following reasons.

As noted in the response filed October 27, 2005, The present invention, as set forth in independent claim 1, is directed to an image processing apparatus. Independent claim 1 recites a memory which stores first images obtained by photographing an object to be rendered from different photographing directions, and second images that pertain to geometry information of the object to be rendered. A geometrical shape model generation unit generates a geometrical shape model of the object to be rendered on the basis of the second images. A microfacet generation unit generates microfacets used to approximate a three-dimensional shape of the geometrical shape model. A billboard processing unit rotates the microfacets to make a predetermined angle with a view direction. A texture mapping unit generates a third image associated with the object to be rendered in correspondence with the view direction by selecting texture images for respective microfacets from the first images on the basis of the photographing directions and view direction, and by projecting the selected texture images onto the microfacets.

The claimed invention can provide numerous advantages. By way of specific non-limiting examples, because microfacets are used to approximate a three-dimensional shape of a model, and these microfacets are rotated to make a predetermined angle with a view direction, the three-dimensional shape of the model can be approximated from any desired viewing direction without requiring that depictions be taken of the model from any and all directions from which the model can be viewed.

In the last response, it was pointed out that the page 5, lines 4-7, last Action assertion that “Beasly teaches executing a billboarding process that rotates the plurality of microfacets to make a predetermined angle with a view direction (column 5, lines 60-67; column 6, lines 62-65; column 7, lines 27-41, i.e. the silhouette images are understood to be projected texture images)” was a mistaken interpretation when the actual teachings of Beasly are compared to the actual limitations of Claim 1. This comparison should have begun with a correct analysis of the meaning of the language of Claim 1 requiring:

a microfacet generation unit which generates a plurality of microfacets used to approximate a three-dimensional shape of the geometrical shape model;

a billboarding processing unit which rotates the plurality of microfacets to make a predetermined angle with a view direction. (Emphasis added).

Thus, any proper analysis of these claimed subject matter must include the requirement the plurality of microfacits must be used to “approximate a three-dimensional shape of the geometrical shape model” where these microfacits that together approximate the three-dimensional shape of the geometrical shape model are what are then rotated by the “billboarding processing unit” to “make a predetermined angle with a view direction.”

Instead of teaching that the required Claim 1 “microfacits” (that must be used to “approximate a three-dimensional shape of the geometrical shape model”) are generated, Beasly teaches (at column 7, lines 27-29) that a “snap shot is taken” that is “turned into a single polygon or low number of polygons billboard.” These snapshots are taken from

different angles but they always form “silhouette forms” (see column 7, lines 29-39) that are clearly shown by Beasly to be two-dimensional outline “silhouette forms” in Figures 2 C, 3A-3C, and Figures 4A-4C. Column 5, lines 38-39, of Beasly actually specify that these “silhouettes are flat (i.e., two dimensional).”

To whatever extent that these silhouettes can be stored in a texture memory as indicated at column 7, lines 39-41, that does not change these actual “two-dimensional” outlines into the claimed “microfacets” that must themselves be used to “approximate a three-dimensional shape of the geometrical shape model.” Accordingly, nothing at column 6, line 47-column 7, line 22, in any way teaches or suggests putting together a plurality of the stored silhouettes to “approximate a three-dimensional shape of the geometrical shape model.” The position to the contrary at page 13, lines 14-18 of the outstanding Action that seeks to concentrate on individual silhouettes with added texture being shown as substitutes for full three-dimensional model renditions is clearly made without a careful analysis of the requirements of the language of Claim 1 and is not well founded any more than the repeated misuse of this flawed rationale at page 5, lines 3-6, of the outstanding Action is.

Just as the analysis in the outstanding action that attempts to equate the Claim 1 required “plurality of microfacets used to approximate a three-dimensional shape of the geometrical shape model” on the individual silhouettes of Beasly that each individually represent a different two-dimensional outline of the three-dimensional model as the Claim 1 “microfacets,” the attempt at page 4, lines 11-14, of the outstanding Action to equate them to the completely different triangle mesh model mentioned at col. 3, lines 1-5 of Suzuki is also improper. The triangle mesh model mentioned at col. 3, lines 1-5 of Suzuki is representative of an object surface based upon the work of Curless and Levoy that is criticized along with the pothier processing techniques in the Description of the Prior Art of col. 1, line 14-col. 3, line 20, as to processing speed. Instead of the criticized processing of Curless and Levoy,

Suzuki teaches the use of silhouettes with voxel calculation in the different disclosed embodiments (silhouettes are formed and voxel calculations are performed in the first to fourth embodiments of Figs. 1-4).

The required reasoning why the artisan would attempt to modify the actual embodiments taught by Suzuki with the noted Prior Art teachings of Curless and Levoy is lacking as is any reasonable explanation as to the further proposed modification of Suzuki by Beasly as the only thing these two references have in common is forming silhouettes. In this regard, the PTO reviewing court requires explanations accompanied by reasonable showings as to motivation. See *In re Kotzab*, 55 USPQ2d 1313, 1316-17 (Fed. Cir. 2000) as follows:

Most if not all inventions arise from a combination of old elements. See *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457 (Fed. Cir.1998). Thus, every element of a claimed invention may often be found in the prior art. See *id.* However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. See *id.* Rather, to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicant. See *In re Dance*, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998); *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir.1984). Even when obviousness is based on a single prior art reference, there must be a showing of a suggestion or motivation to modify the teachings of that reference. See *B.F. Goodrich Co. v. Aircraft Breaking Sys. Corp.*, 72 F.3d 1577, 1582, 37 USPQ2d 1314, 1318 (Fed. Cir. 1996).

Also note *In re Kahn*, 78 USPQ2d 1329, 1336 (CA FC 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”).

The outstanding Action offers only a conclusion that the artisan would want to use the Beasly billboard teaching (actually drawn to substituting various different orientation from storage to substitute for full three-dimensional models under certain circumstances) to modify Suzuki without a hint of how this could even be attempted without extensive

modifications to Suzuki that would destroy or completely change the purpose thereof or that would render Suzuki incapable of performing as intended. See *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959) and *In re Gordon*, 733 F.2d 900, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

In this regard, it is noted that if Beasly and the above-noted Prior Art teachings of Curless and Levoy as to triangle mesh polygons were to be forcibly combined with the actual Suzuki embodiments it would have to be so that the triangle mesh could be viewed in different orientations according to different view directions of no concern to Suzuki. But the manner that it would be even possible to rotate each triangular mesh as to a changed viewing direction is not explained at all in the outstanding Action and seemingly impossible.

In the final analysis, Beasly teaches billboarding in which a silhouette based on a level of detail is prepared and a Suzuki teaches restructuring a scene from a remote location using a voxel form obtained by a shape from a silhouette. The reason the artisan would reasonably have been led to select these disparate references, much less how the artisan would even go about modifying these disparate references in an attempt to combine their disparate teachings has not been presented which violates further court imposed requirements. See *In re Rouffet*, 149 F. 3d 1350, 1359, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998) (Aeven when the level of skill in the art is high, the [PTO] must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the [PTO] must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious.≡) and *In re Lee*, 277 F.3d 1338, 1342, 61 USPQ2d 1430, 1432-33 (Fed. Cir. 2002) as follows:

... the agency tribunal must present a full and reasoned explanation of its decision. The agency tribunal must set forth its findings and the grounds thereof, as supported by the agency record, and explain its application of the law to the found facts.

For the above-noted reasons it is requested that the rejection of independent Claim 1 be withdrawn and that independent claim 1 be allowed.

Independent Claims 8 and 14 are respectfully submitted to be allowable for reasons similar to those of argued above as to independent Claim 1. Therefore, the allowance of independent Claims 8 and 14 is respectfully submitted to also be in order.

Claims 2, 5, 9, 12, and 15 are claims that ultimately depend from one of these independent Claims 1, 8, and 14. Accordingly, these dependent claims are believed to be allowable for the same reasons advanced above as to independent Claims 1, 8 and 14 from which they depend, as well as for their own recited features. Thus, the allowance of dependent Claims 5, 9, 12, and 15 is also respectfully requested.

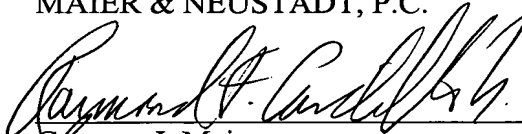
As none of Neugebauer, Ogata, or Gannett cure the above-noted deficiencies as to Suzuki and/or Beasley, Claims 3, 4, 6, 7, 10, 11, 13, 16, 17, and 19 that also ultimately depend from one of the above-noted independent Claims 1, 8, and 14 are believed to be allowable for the same reasons advanced above as to independent Claims 1, 8 and 14 from which they depend, as well as for their own recited features. Thus, the allowance of dependent Claims 3, 4, 6, 7, 10, 11, 13, 16, 17, and 19 is also respectfully requested.

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Reply to Office Action of 02/17/2006

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact Applicant's undersigned representative at the below listed telephone number.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read "Raymond F. Cardillo, Jr.", is written over a horizontal line.

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